

PI 320/400/500 DC
Instruction manual
使用说明书




MIGATRONIC

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一致性声明

EC DECLARATION OF CONFORMITY	
MIGATRONIC A/S Aggersundvej 33 9690 Fjerritslev Denmark	
hereby declare that our machine as stated below	
Type:	PI 320/400/500 DC
As of	Week 26 2007
conforms to directives 2006/95/EC and 2004/108/EC	
European Standards:	EN/IEC60974-1 EN/IEC60974-2 EN/IEC60974-3 EN/IEC60974-10 (Class A)
Issued in Fjerritslev on 25th June 2007.	
 Peter Roed Managing director	



警告



电弧焊设备和电弧切割设备在操作或运用不当时，会对操作的人、工场附近的人、或附近的物品产生危险。因此，必须严格按照相关的安全规则的指示使用设备。您尤其需要注意以下的事项：电

-必须根据安全规则安装焊机，并由合格的受过专业培训的人安装。焊机必须接地线。-确保焊机受到正确的保养。-如若电缆或绝缘层有破损，必须立即停止工作，进行维修。-维修和保养须由合格的受过专业培训的人进行。-避免裸手接触任何带电的电路或部件，以及带电的电极或焊丝，必须使用无破损的焊接手套。-确保与地面绝缘（如：穿上橡胶底鞋子）-用安全稳固的地方作工位（如：避免摔跌的危险）

光和热辐射

-即使是短暂的裸眼暴露于弧光也会对眼睛造成持续性伤害，请使用带防辐射滤镜的头盔保护。-因为弧光辐射会对会致伤皮肤，请穿着防护服作好防弧光辐射保护。-如果可能，工场应使用屏板隔离，并且警示工场区域的人员避免弧光辐射。

焊接烟尘

-焊接烟尘有害健康，请确保排烟系统能正常工作，并且保证通风良好。

火灾

-弧光辐射和焊接飞溅可引起火灾；所以，必须将焊接工场的可燃烧物品排除掉。-工作服须能承受焊接飞溅，（如：选用防火材料制成的衣服，小心衣服的皱褶卷口和开口的衣兜。）-所有现行的室内防火防爆的条例都应严格遵守。

噪音

-焊接时，电弧会产生噪音，在必要的情况下，请采取措施保护听力。

危险区域

-送丝机里的送丝轮在转动时，必须避免将手指伸到送丝轮之间。-在封闭的场合焊接时须特别注意，或者在高位操作有跌落危险时必须注意。

焊机置放

-平稳地置放焊机，保证焊机不会倾倒。-所有现行的室内防火防爆的条例都应严格遵守。

反对将焊机用于其设计之外的用途（如未解冻的水管）。如果坚持此类不正常使用，我公司不承担任何责任。

在安装和使用本焊机前
请仔细阅读这本使用说明书

电磁泄露和辐射及电磁干扰

本焊机为工业和专业的焊接设备，符合欧洲标准 **EN/IEC60974-10**。该标准的目的是为了防止焊接设备受到干扰或焊接设备自身对其他电子设备和仪器形成干扰。电弧会造成干扰，因此，为了在操作时不受干扰或中断，要求在安装和使用本焊机时采取一定的措施。操作者务必保证焊机的操作没有上述提及的干扰。

工场周围区域应注意下列：

- 1.在施工区域里的其他电器设备的供电线和信号线。
- 2.无线电或电视转播器和接收器。
- 3.电脑和其他任何电控设备。

4.关键的保护设备，如电子电器控制的安全保护系统。

5 戴有心脏起搏器的人和戴有助听器的人

6.校准设备和测量设备。

7.进行焊接或其他工作的时间。

8. 建筑物的结构和用途。

如果在室内使用焊机，为防止泄露问题，必要加以格外谨慎（如，了解这个焊接工作的情况）。减少电磁泄露的方法：

1.避免使用会产生干扰的设备。

2.用短焊枪

焊枪配置

PI 320/400/500 DC

PI 320/400/500 DC是一款三相水冷MMA和TIG焊机。订购焊机，既可指定不带承载小车，也可指定配带承载小车。

焊枪

这款焊机可配置TIG焊枪。

此外，我们还提供如下部件：

- 地（请记住插入一个特殊的不带杆的型号，专用于水冷焊枪）
- 手持电位计（8孔插头）
- 数字气流控制件
- 冷却液控制件

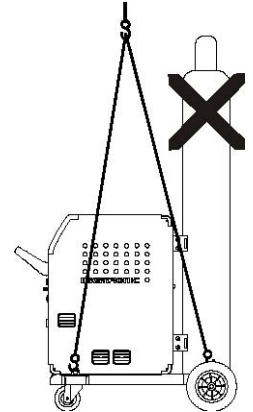
准备工作

输入电缆连接

在将焊机接到输入电源前，请确保焊机额定电压与输入的供电电压一致，并确保所用的保险丝规格正确。焊机的输入电缆（1）必须连接正确的三相交流供电电源，50赫兹或60赫兹，必须连接地线。极相的顺序并不重要。主开关（2）控制电源的开/关。

吊装说明

吊装焊机时必须用到图中所示的吊装支点。吊装时必须把气瓶取下。



装配声明

米加尼克拒不承担所有因使用不符合规格的焊枪和电缆而导致的电缆损坏或其他部件的损坏的责任。用户务必使用能承受实际荷载的焊枪和电缆。

警告

将焊机直接连接到发电机上可损坏焊机。

当把焊机连接到发电机上时，发电机产生的大电压脉冲可烧坏焊机。只能使用频率和电压都稳定的异步发电机。

因直接将焊机连接到发电机上而导致的损坏或故障不在保修之内。

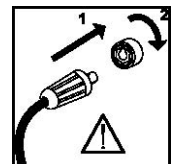


请根据当地法规和标准处理废料。

www.migatronik.com/goto/weee

重要！

为了避免插头和缆线被破坏，请保证地线连接，焊枪与电源的连接接触良好。



保护气连接

气体软管必须连接到降压阀后才能连接到输气系统上。将气体软管连接到焊机前面的气体连接嘴上，并确保连接稳固。

防扩散导气管

本焊机已装配有PVC导气管，这种导气管满足一般的焊接工作。特殊的焊接工作，对气体纯度要求高的情况，我们建议配用防扩散的导气管。防扩散导气管保证湿度低，能保护气体。这些特殊的导气管可作为特殊部件订购。安装时，应从供气端直到电磁阀安装。

焊接电缆的连接

将正、负极焊接电缆连接到焊机前方的插座中。请注意，在把电极插头插入插座后，往右旋转45度，以保证接触良好。否则，插头可能会因电阻过大而烧坏。

TIG焊焊枪一律接入负极（-）插座（5），而另外的电极接入正极（+）插座（6）。

TIG焊的控制信号是通过航空插座(7)输送到焊机电源的。在将插头接入航空插座时，请确保将插头旋紧。将导气管接入快速插座上。

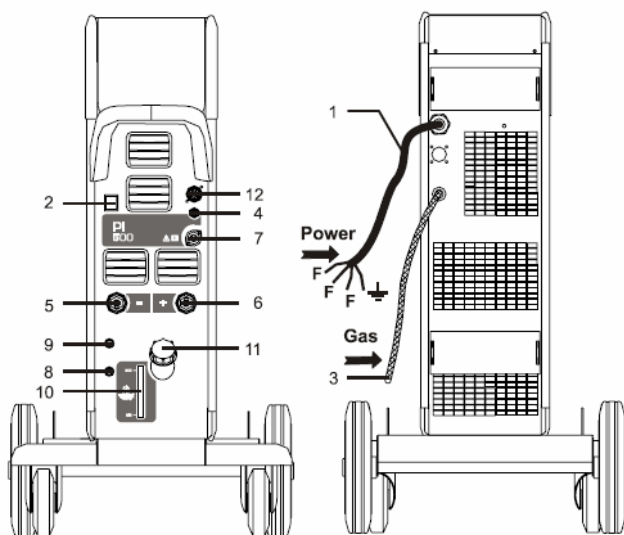
药皮焊条：焊条的包装上标注有电极。将焊把对应该标注，把接入正极或负极接入焊机的插座上。

TIG焊枪的连接

将冷却液导管接入蓝色的快速插头（8），冷却液回流导管接入红色的快速插头（9）。

冷却液控制

焊机在发送前已装配了水冷系统。应定期检查冷却液的多少，通过水平计（10）检查。添加冷却液，通过加液嘴（11）添加。



MMA 焊焊把的连接

将手工焊焊把连接到正极插座上（6），而另一极连接到负极插座（5）上。并请在选择电极时注意焊条的说明书。

脚踏控制器的连接

脚踏控制器与航空插座（7）连接，或与插座（12）连接。（取决于脚踏控制器的类型。）

遥控器的连接

Pi焊机装有一个8孔的控制插座，可与遥控器或机器人连接。作为遥控器插座时，其端子功能如下：

A: 输入焊接电流，0-10V输入电阻：1Mohm

B: 信号地

C: 电弧监测-继电器

连接（最大1Amp），完全绝缘

D: 数字信号

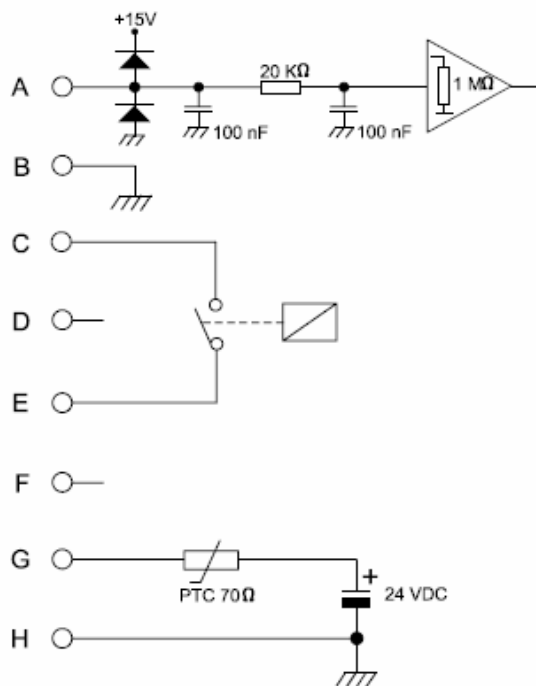
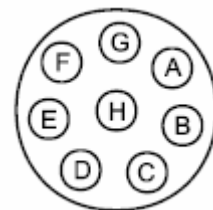
E: 电弧监测-继电器连接

（最大1Amp），完全绝缘

F: 数字信号

G: 输入+24VDC. PTC 电阻器短路保护（最大50mA）

H: 输入地



CWF Multi（选配）

我们可以通过CAN BUS接头连接8个**CWF Multi**单元并放置在机器的后部（选配）。为了获得这项控制能力，进入用户菜单，选择“**Fdr**”（送丝机），然后进入“**Act**”（激活装置）并把参数设成1（见用户菜单）。

现在**PI**可以通过面板来直接控制**CWF**了：当**CWF**单元被激活，并且相关的**CWF**程序在1~20的范围内，对于每一个**TIG**焊接程序都可选。

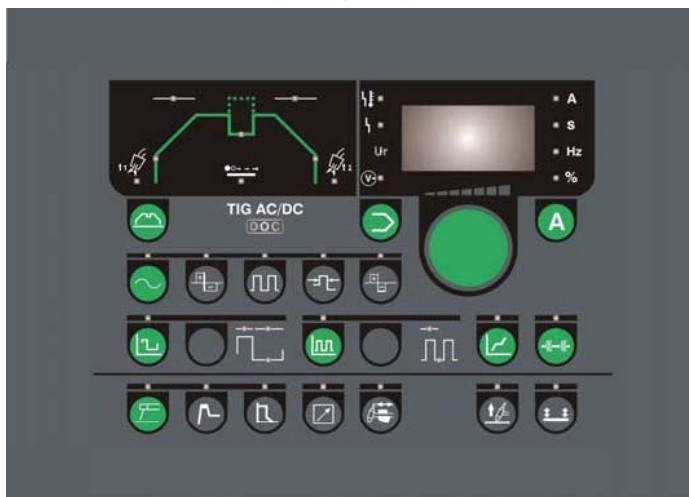
取决于**CWF**的设置，如果**CWF**在**OFF**模式，“**Fdr**”的错误信息会显示在**PI**上，而焊接过程停止。这是在告知用户，**CWF**已经不响应**PI**机器。

焊机用法

在焊接时，有不同的部件会产热，在焊接暂停时，这些部件会得到降温。此时，请确保冷却液继续循环。当焊接电流较高时，需要一段时间以冷却焊机。这段时间的长短取决于设置电流，这个时候不需要关掉焊机。在使用焊机的过程中，如果这段暂停时间不足，

过热保护功能会自动停止焊接工作，前面板上的黄色指示灯随之亮起。该黄色指示灯在焊机充分冷却后熄灭，那么焊机可以继续进行焊接工作了。

控制面板



控制旋钮

所有的参数都用这个控制旋钮设置。这些参数包括：焊接电流、脉冲时间、电流缓升时间，等等。该控制旋钮在控制面板的右半部分。它上面的显示屏当前所设置的参数值。显示屏的右边标示了各个参数的单位符号。一个参数，由其相应的键选择。指示灯变亮表示一个参数已选择。这时，转动控制旋钮以调节这个参数的数值。



储存参数为程序

这个功能可以把焊接工艺程序（即常用设置参数）储存起来，从一个程序转换到另一个程序。点按此键，显示屏上显示字母“P”和一个数字，如“1”，“2”等。一个数字包含了一个程序的全部参数和它们在焊机上实现的功能。因此，每一个焊接工作都可以有一个焊接工艺程序。

每一种焊接方法可以储存10套程序，（**MMA DC** 和 **TIG DC**），加起来共20套程序。

每个程序都可以：

1. 在**MMA**和**TIG**之间选择。
3. 最后，选择程序号（**P01...P10**）。按下该程序键，不放开，然后转动控制旋钮，这样也可以选择程序号。

最后所用那个程序（**MMA DC**, **TIG DC**分别都有一个），会在该程序键启用时显示出来。

重新设置程序

选定一个需要恢复为出厂设置的参数，然后按下



键，持续10秒钟，不用转动控制旋钮。

当程序号在显示屏上闪烁时，这个程序被恢复出厂设置，这时放开



焊接电流

在焊机没有选用遥控功能时，按此键可以显示焊接电流。根据不同型号的焊机，可在**5A-320A**，**400A**，**500A**之间调节其数值。在焊接停止后，设置的焊接电流显示在显示屏上。在焊接过程中，显示的是实际焊机电流。在脉冲焊中，显示的是平均焊接电流，因为焊接电流与基值电流之间的快速转换，超过了视力所及。



参数单位

图标显示了参数的测量单位。



焊接电压指示灯

为了安全，所以使用电压指示灯，它显示输出插头上是否存在电压。



过热报警

过热报警指示灯在焊机因过热而中断焊接工作时变亮。



输入电源错误报警

当输入电压低于了额定电压的15%时，该指示灯变亮。



冷却错误

如果误用焊枪，或焊枪没有连接，则显示冷却错误。如果用了流量控制装置，冷却错误可能显示冷却单元的问题，按MMA键可重置错误代码。

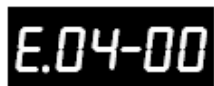


错误图标

这个图标中的指示灯闪烁时，表示发生了其他的错误。同时，显示屏显示出一个错误代码

摘录的错误代码：

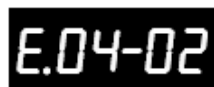
(这些错误代码可通过按MMA键重置)



焊枪冷却错误

因为导管连接错误或阻塞而引起冷却液不能流通循环则显示该代码。

检查冷却液导管是否连接正确，并加满冷却箱，检查焊枪里的导管和分支导管。



输入电压错误

显示这个代码时，表示输入电压过高。

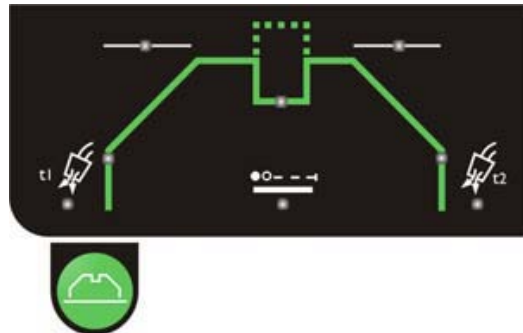
将焊机连接到400V AC, +/-15% 50-60Hz的供电电源上。

其他类型的错误

如果显示出其他的代码，应该关掉电源开关再打开，以清除错误符号。

如果反复显示这个错误符号，这时应该维修焊机电源。请向您的供应商咨询关于错误的信息。

TIG 焊接



TIG 焊接

这些参数，当它们显示出来的时候可以用控制旋钮进行调节。点按相应的键选择参数，选择后，对应的指示灯会亮起。



提前送气时间[s]

提前送气时间是在焊枪开关按下后，高频起弧开始之前的一段送气时间。可在0-10秒之间设置。在接触起弧方式中，这段时间是电极离开工件前的一段时间。



起弧电流[A%]:

在弧引燃后，焊机立即将焊接电流调节到设置的起弧电流。起弧电流以焊接电流的百分值计算，可在1-200%之间设置。请注意，设置大于100%的起弧电流是高于焊接电流的。



电流缓升[s]:

在弧引燃后，焊接过程进入到电流缓升阶段，在电流缓升中，电流从起弧电流逐渐上升到焊接电流。电流缓升的时间可在0-20秒间。



二级电流水平

二级电流以焊接电流的百分值计，可在焊接电流的10-200%间调节。它只在4-步模式中有有效，快速的按下并放开焊枪开关激活。请注意，二级电流设置大于100%时，其值是高于焊接电流的。



电流缓降[s]:

在按下焊枪开关停止焊接时，焊机进入电流缓降阶段。在电流缓降阶段中，焊接电流降到收弧电流，这段时间较电流缓降时间。可在0-20秒间设置。



收弧电流[A%]:

在焊接电流降到收弧电流水平时，电流缓降便完成。在4-步模式中，收弧电流可

以保持一段时间，直到焊枪开关被放开。收弧电流是以焊接电流的百分值计算，可在1-90 %间设置。



滞后停气[s]:

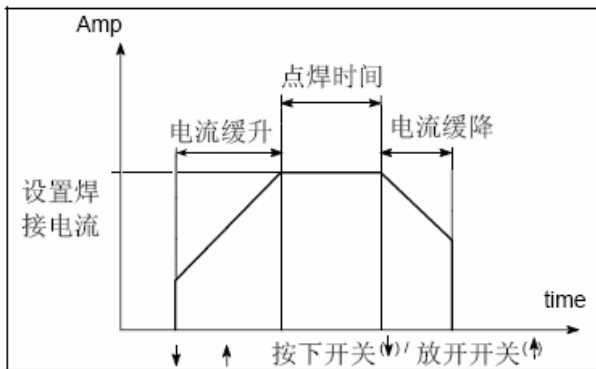
滞后停气是在电弧熄灭后气体继续输送的一段时间，在0-20秒之间设置。



点焊时间

在TIG中点焊时间是电流缓升结束到电流缓降开始之间的一段时间。因此，点焊中的电流为设置的焊接电流。该功能

激活时，指示灯闪烁。



在引弧前设置点焊的时间。焊枪开关的控制可以影响点焊时间，所以这又取决于开关模式（2-步/4-步模式）。点焊时间可在0.01-20秒间设置。当时间设置为0时，功能失效。



保护气控制件（选配）

如果在焊机上安装一个特殊的气体流量控制件，那么就可以调节气体的流量

点按 键直到提前送气和滞后停气指示灯变亮。气体流量可在4-26升/分间调节。当气体流量设置在27l，气阀将完全打开流量调节失效。



CWF焊丝程序（可选）

按住 直到电流缓升和电流缓降灯亮，显示屏会显示X.YY，X是CWF单元，YY是用到的程序号码。旋转旋钮到所需的单元/程序。0.00表示没有用CWF（默认设置）。



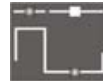
低频脉冲

这个功能键用来选择低频脉冲。脉冲电流与设置电流相同，可对它作调节：



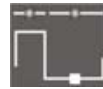
脉冲时间

DC时可在0.01-10秒设置，每步/级为0.01秒。



停止时间

DC时可在0.01-10秒设置，每步/级为0.01秒。



基值电流

可在脉冲电流的10-90%间设置。



高频脉冲（仅TIG DC）

这个功能键用来选择高频脉冲。脉冲电流与设置电流相同，可对它作调节：



脉冲频率

TIG DC焊时，频率范围为25-523赫兹，MMA DC焊时，频率范围为25-100赫兹。



基值电流

可在脉冲电流的10-90%间设置。



SynergyPLUS™（仅TIG DC）

峰值电流设置好后，焊机会在焊接过程中自动地动态地调节所有的脉冲参数。



TIG点焊

这款焊机提供一个点焊程序，可在正常焊接和点焊间快速转换。有如下的特点：

- 2-步模式下的高频起弧
- 屏闭了电流缓升缓降功能
- 没有脉冲



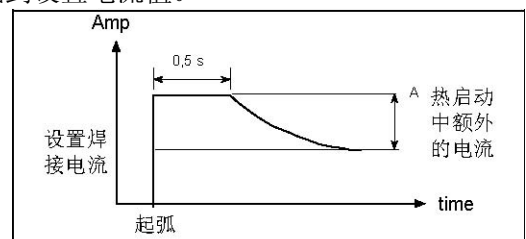
焊条焊接（MMA）

这个功能键用以选择手工焊。在焊接过程中是不能变换焊接方法的。



热启动

在手工焊时，这个功能可辅助起弧。当焊条在接触工件时，通过增加设置焊接电流值便可实现热启动。这个增加的起弧电流持续半秒，然后降低到设置电流值。



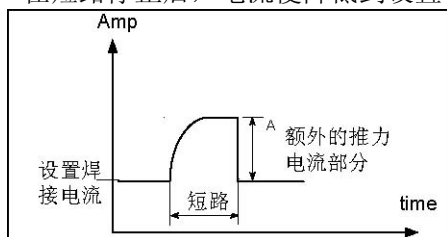
热启动值是在起弧时，以设置电流的百分比计算的增

加值，可以在0-100%间设置。



推力电流

在手工焊时，推力电流用以稳定电弧。可以在短路时通过增加焊接电流取得推力电流。在短路停止后，电流便降低到设置值。



推力电流以设置焊接电流的百分值计算，可在0-100%间调节。

如：设置焊接电流为40A，设置推力电流为50%，那么就是在焊接电流上加20A，推力电流就是60A；如果设为100%，那么就加40A，推力电流为80A。



焊枪遥控/调节-7孔插头

可以使用焊枪电位计（选配）调节电流。最大可调电流为控制面板所设置的电流，而最小可调到7A。



遥控调节-8孔插头（选配）

这个8孔插头的遥控输出口用于连接脚踏 遥控器（选配）和遥控盒（选配）。该遥控调节功能用来起弧和调节电流。最大可调电流为控制面板上所设置的电流。实际焊接电流显示在显示屏上。



起弧方式

TIG焊时有两种起弧方式可选：高频/**HF**起弧，接触/**LIFTIG**起弧。起弧方式在焊接过程中是不能切换的。指示灯亮时表示所选为接触/**LIFTIG**方式。指示灯熄灭则自动切换为高频起弧。

高频/**HF**起弧

高频起弧：在**TIG**焊中无需电极与工件接触的起弧方式。焊枪开关打开时，以高频率冲波引燃电弧。若引弧不成功，而电极接触到工件焊机则停止工作。这时应取下电极，再重新开始。

接触/**LIFTIG**起弧

接触/**LIFTIG**起弧：在**TIG**焊中，将电极与工件接触，然后打开焊枪开关，随即将电极从工件上抬起，在电极离开工件时电弧引燃。



2-步/4-步焊接模式

在**TIG**焊中，这个键用以选择焊接的开始/停止是用2-步模式还是4-步模式。在焊接过程中不可以切换焊枪开关的模式。指示灯变亮，所选为4-步模式。

2-步焊接模式

按下焊枪开关，焊接开始，在直到放开开关以前，焊接都一直进行。放开开关时，电流缓降开始。

4-步焊接模式

按下焊枪开关，焊接开始。如果在电流缓升其内放开开关，焊接便以设置的焊接电流进行焊接。要停止焊接，则再次按下焊枪开关，须按下0.5秒以上，以便进入电流缓降期。电流缓降会在放开开关时停止，之后进入保护气滞后停送阶段。

当选择4-步焊接模式，机器可以在三种不同的方式下工作。

详细的信息请参考用户菜单中的“4t.o.”。

防粘功能

本焊机具备防粘控制功能。防粘控制是在电极粘着于工件时减小电流，使电极更容易地脱离工件，焊接工作便得以继续。


将所有参数恢复出厂设置
所有参数都可能恢复到出厂设置。在此种情况下，各参数应设置为下面的参数：


- * MMA电流为80A
- * MMA热启动50%
- * MMA推力电流50%
- * TIG电流为80A
- * TIG点焊电流为80A
- * 提前送气0.0秒
- * 滞后停气3.0秒
- * 无电流缓升/缓降
- * 起弧电流40%
- * 收弧电流20%
- * 二级电流水平50%
- * 基值电流40%
- * 高频脉冲49赫兹
- * 脉停时间=脉冲时间=0.1秒

恢复设置的操作程序：
关掉焊机电源，直到显示屏

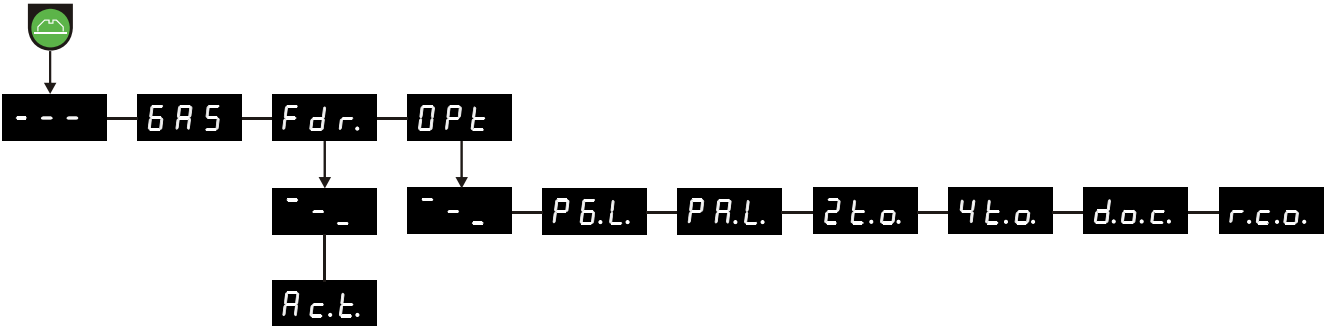


关闭。然后同时按下这两个键（右图）。在两个键被按下时打开焊机电源，直到显示屏上显示出“X.XX”的字样，此时便可放开按键。
X.XX表示程序的版本。

将某一单个程序恢复出厂设置
选择一个将要恢复的程序，然后按下键，持续5秒钟后松开，不用调节控制旋钮。显示屏上的这个程序号开始闪烁，表示已恢复设置。这时松开按键，这个程序的参数已恢复无出厂设置，程序中各数值如上所列出的。

用户菜单
这个菜单意在教用户使用一些先进的功能。
当机器不在焊接，按住3秒钟，就可看到用户菜单。旋转旋钮到所需的选项，按“A”确认。按住MMA键并旋转旋钮可变换参数值，按“A”储存所选数据。同时按住“---”和“A”退出用户菜单。

下面的图标显示了所有的参数和选项菜单。



--- 退出用户菜单

GAS 开/关气阀以便疏通焊枪，检查气瓶和减压装置。按住“A”开/关气体。退出用户菜单将关闭气体。
Fdr. 送丝机子菜单

- - - 退出子菜单

Ac.t. CWF使用控制
0=没有用CWF（默认设置）
1=至少用一个CWF

Opt 子菜单包含的不同选项：
- - - 退出子菜单（回到主菜单）

P6.L. 程序锁定
P3到P10的程序保护，避免无意识的误变换。
◆ 焊接电流，缓升，缓降，定时
◆ 2步/4步模式选择
◆ 内/外电流参考值
◆ 脉动

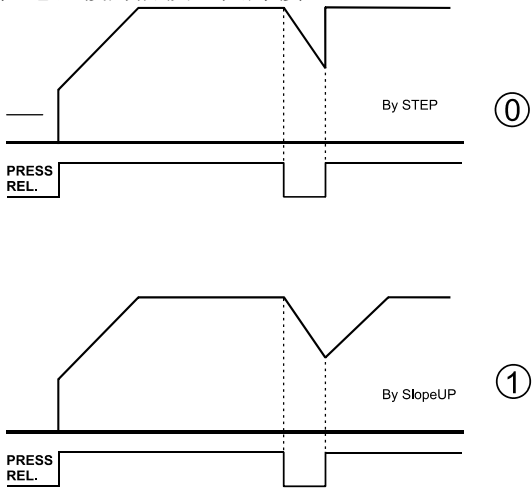
但是P1和P2是不锁的，所以我们还是可以选择这两个程序和相应的参数的。
当按住锁定键或者旋转旋钮到锁定参数，显示屏会闪烁“PG.L.”以记忆程序保护激活。
0=未锁定（默认设置）
1=锁定

P.A.L. 面板锁定

完全锁定，所有的按键旋钮都不可用。
当按住锁定键或者旋转旋钮，显示屏会闪烁“PA.L.”以记忆场面板锁定。
0=未锁定（默认设置）
1=锁定

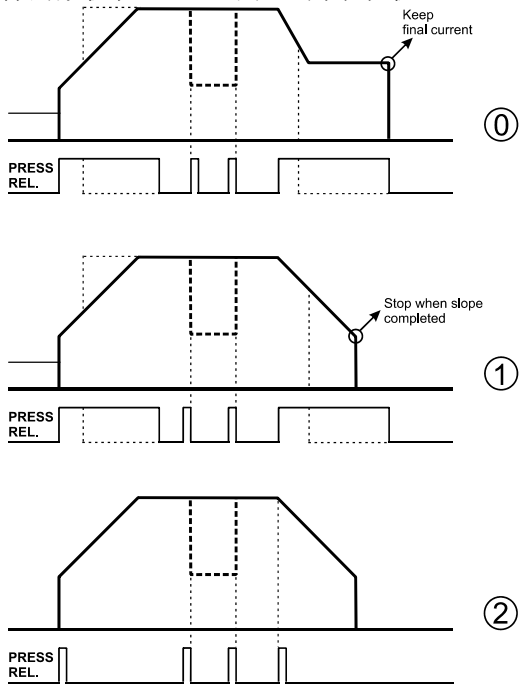
2 t.o. 焊枪开关的2-步模式

在电流缓降阶段可以定义两种不同的方式去控制机器的开关。具体的不同见下面的图表
0=直接回到焊接电流（默认）
1=在电流缓升阶段返回焊接



4 t.o. 焊枪开关的4-步模式

当机器设定为4-步模式（接触或高频）可以定义3种不同的方式去控制焊枪的开关。具体的不同见下面的图表。
可选择的数值在0....2之间（1为默认值）。



d.o.c. 动态氧化物控制（AC焊接）

0=功能不可用
1=功能可用（工厂设置）

r.c.o. 选配远程控制

如果外部选配8芯插头装置，就可以选择4种不同的方式做远程控制。焊接电流可在原来的设置和最大之间变换。外电压可以是0-10V或0-5V（2&3是较低端的解决方式）。

0=0-10V → （出厂设置）
1=0-10V →
2=0-5V →
3=0-5V →

所有以上的设置都不能通过机器重置更改。

技术参数

电源型号:	PI 320 AC/DC	PI 400 AC/DC	PI 500 AC/DC
输入电压(50Hz-60Hz)	3 x 400 V ±15%	3 x 400 V ±15%	3 x 400 V ±15%
保险丝容量	16A	25A	32A
有效输入电流	14.0A	17.3A	25.8A
最大输入电流	22.4A	28.0A	44.9A
额定输入容量, (100%)	9.7kVA	12.0kVA	17.9kVA
最大输入容量	15.5kVA	19.3kVA	31.0kVA
空载损耗	40W	40W	40W
效率	0.9	0.9	0.9
功率因素	0.85	0.85	0.85
输出电流范围	5-320A	5-400A	5-500A
可负载			
负载持续率20° TIG 100%	305A	330A	475A
负载持续率20° MMA 100%	280A	330A	475A
负载持续率20° TIG 最大	320A/95%	400A/70%	500A/80%
负载持续率20° MMA 最大	320A/60%	400A/50%	500A/65%
负载持续率40° TIG 100%	265A	290A	420A
负载持续率40° MMA 100%	235A	290A	420A
负载持续率40° TIG 60%	290A	350A	500A
负载持续率40° MMA 60%	270A	350A	450A
负载持续率40° TIG 最大	320A/50%	400A/40%	500A/60%
负载持续率40° MMA 最大	320A/35%	400A/20%	500A/55%
空载电压	95V	95V	95V
¹ 适用等级	S	S	S
² 防护等级(IEC 529)	IP23	IP23	IP23
执行标准	EN/IEC60974-1 EN/IEC60974-2 EN/IEC60974-3 EN/IEC60974-10(Class A)	EN/IEC60974-1 EN/IEC60974-2 EN/IEC60974-3 EN/IEC60974-10(Class A)	EN/IEC60974-1 EN/IEC60974-2 EN/IEC60974-3 EN/IEC60974-10(Class A)
外型尺寸(HxWxL)(cm)	98x54.5x109	98x54.5x109	98x54.5x109
重量-不含冷却液	62KG	63KG	68KG
冷却装置			
冷却功率	1.2kW		
冷却液缸容积	3.5litres		
执行标准	EN/IEC60974-2		
流量	1.75 l/min-1.2 bar-60° C		
最大压力	3 bar		
功能	焊接方法	PI 320/400/500 AC/DC	
推力电流	Electrode	0-100%	
热启动	Electrode	0-100%	
防粘功能	TIG/Electrode	保持开启	
起弧电流	TIG	1-200%	
收弧电流	TIG	1-90%	
电流缓升	TIG	0-20秒	
电流缓降	TIG	0-20秒	
提前送气	TIG	0-10秒	
滞后停气	TIG	0-20秒	
点焊时间	TIG	0-180秒	
脉冲时间	TIG/MMA	0.01-10秒	
脉停时间	TIG/MMA	0.01-10秒	
基值电流	TIG/MMA	10-90%	
二级电流水平	TIG	10-200%	
TIG焊起弧方式	TIG	高频HF / 接触 LIFTIG	
焊接模式	TIG	2/4-步	

1. **S**焊机达到在触电危险高的环境下工作的要求。
2. 有IP23标志的设备可在室内、室外使用。

维护

焊机需要定期的维护和清洁，以避免发生故障和保修条款失效。

警告！

维护和清洁工作只能由受过培训的合格的技术人员进行。焊机必须断开供电电源（取下输入电源插头！）。然后等候5分钟左右再作维护和修理，因为所有电容器都需要放电，以防触电。

冷却单元

- 冷却液水平和防冻状态必须检查，冷却液需要添加。
- 抽出缸里和焊枪里的冷却液，祛除里面的沉积物，并用清洁水冲洗。重新加入冷却液。焊机在出货时已装有1：3的丙二醇液，含有-10度低温的防冻溶液。（参看备用零件表中的零件号）

电源

- 清洁风扇的叶片和各个零件，需用清洁干燥的压缩空气。
- 至少一年作一次检查，由合格技术人员进行。

保修条款

针对潜在的缺陷，所有米加尼克的焊机都有12个月的保修期。这些缺陷必须在发现两个月内通报。本保修期从向终端用户开具发票起的12个月。

本保修条款不包括：由于错误安装、异物、运输损坏、水或火志损坏，闪电袭击、与同步发电机连接或在产品说明之外的非正常条件下使用造成的错误。

缺少维护

如果没有对焊机进行适当的维护，则不在保修条款之内，如严重极垢没，影响冷却。保修条款也不覆盖由可查明的未授权的或不正确的维修导致的损坏。

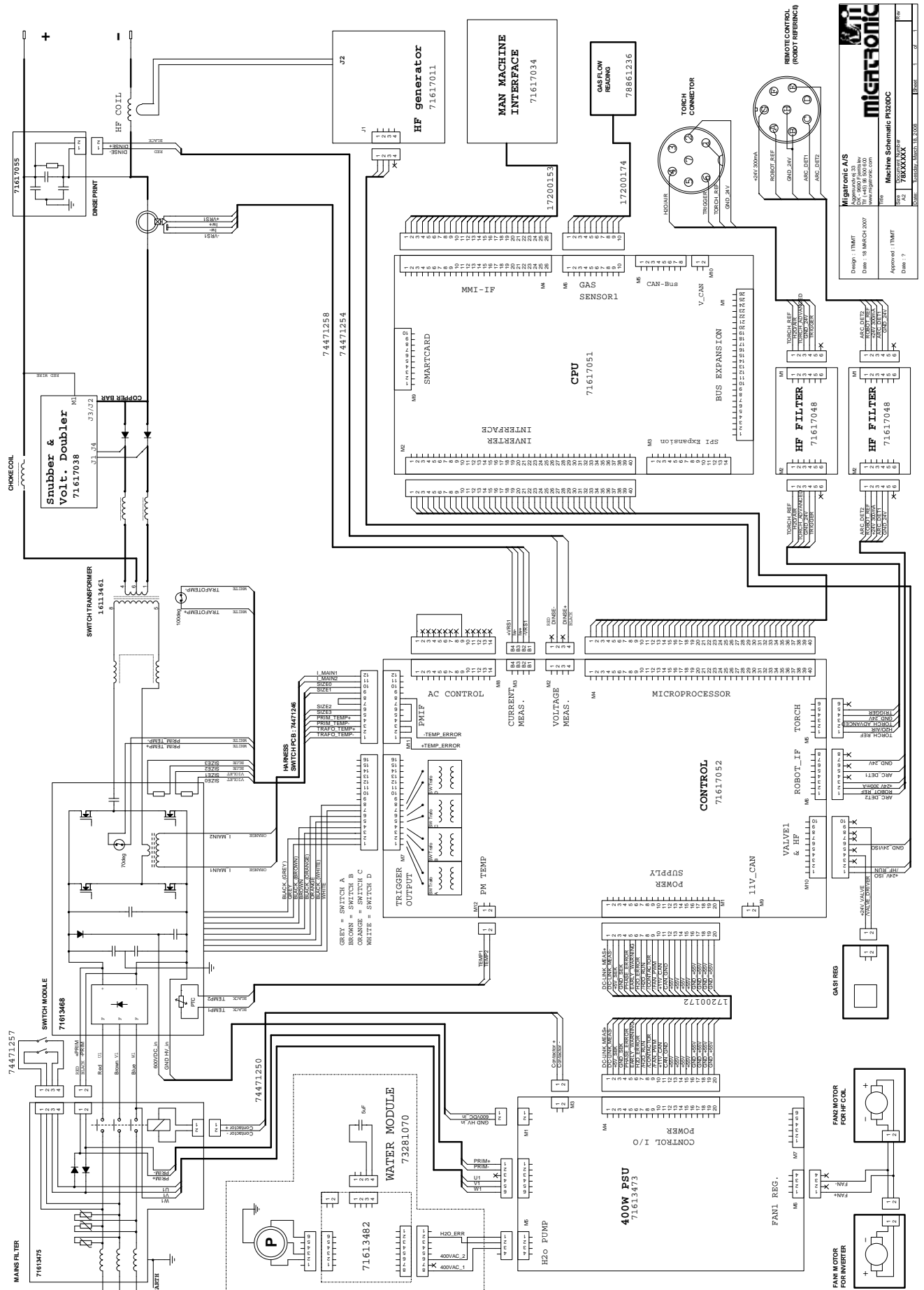
耗材耗件

本保修条款不覆盖耗材耗件（焊枪，焊接电缆和送丝轮）。

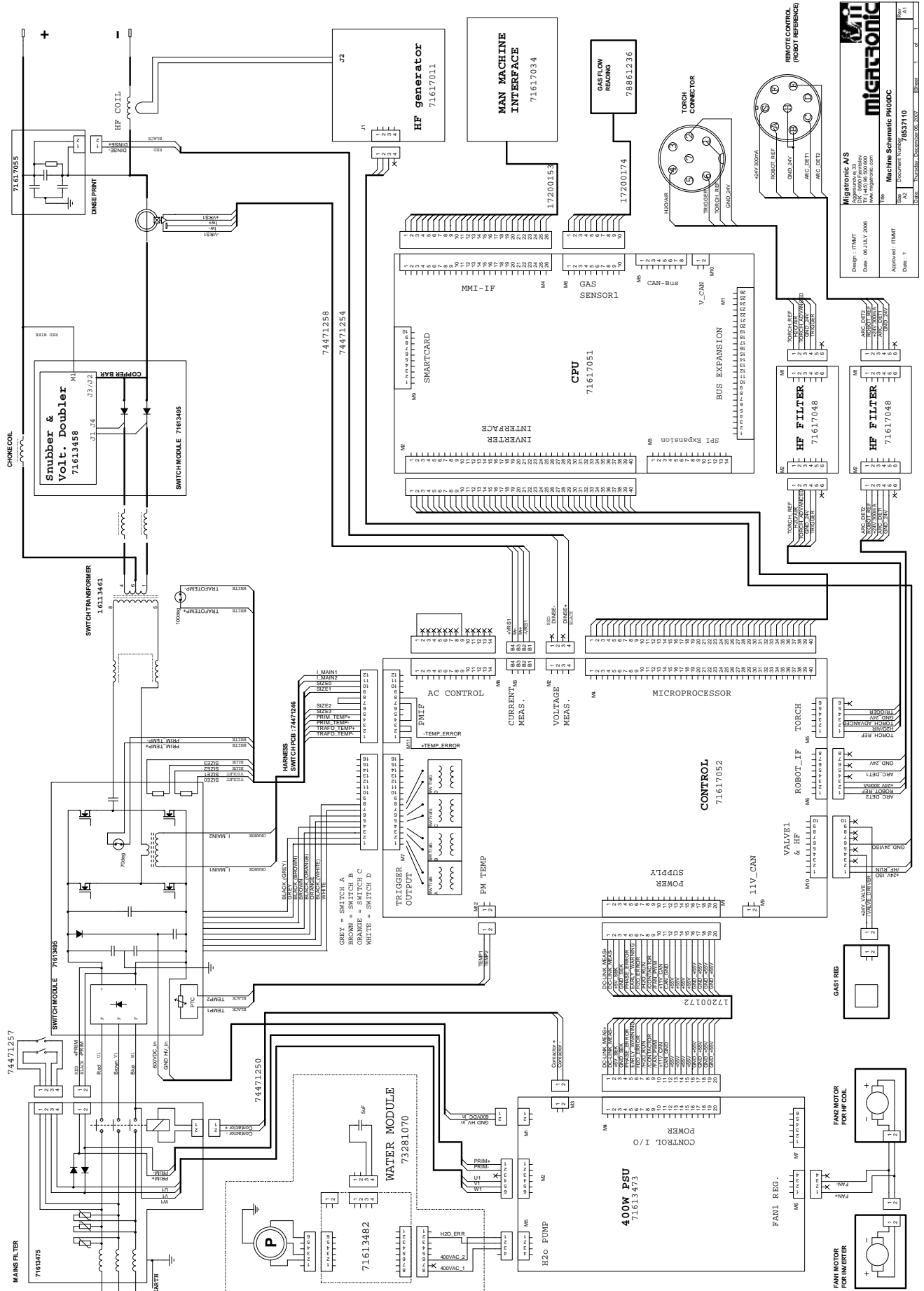
继发性损坏

在发现有缺陷时应立即停止使用焊机，以避免进一步的损坏。本保修条款不覆盖已知损坏引起的继发性损坏。此外，本保修条款也不覆盖该焊机的已知错误引起的其它物件的损坏。

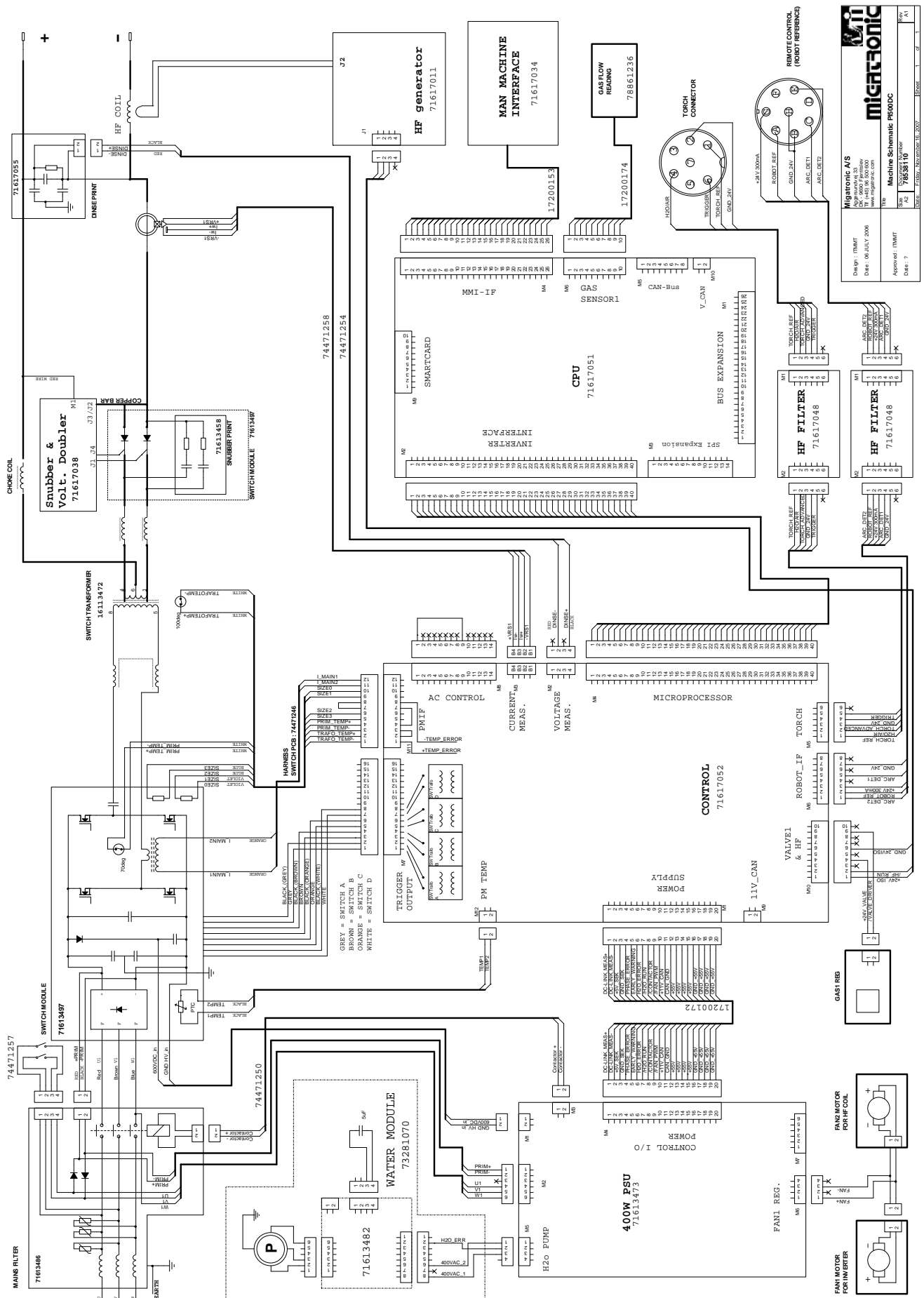
PI 320 DC



PI 400 DC



PI 500 DC



Migatronic AS
 Design: T/MAT
 Date: 08 JULY 2006
 Approved: T/MAT
 Date: 7
 Machine Schematic P500DC
 Part: 78861236
 Rev: 1

PI 320/400/500 DC

Spare parts list

备用零件表

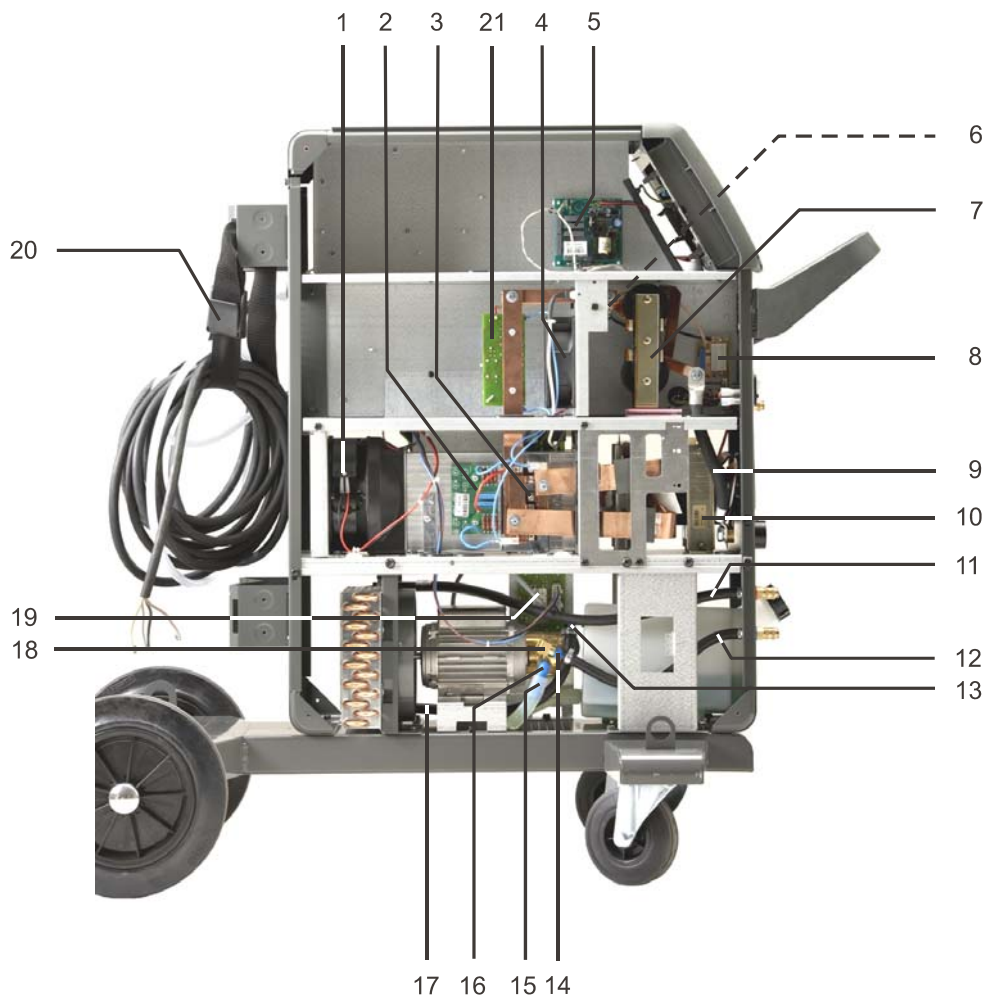
2008年10月生效

PI 320/400/500DC



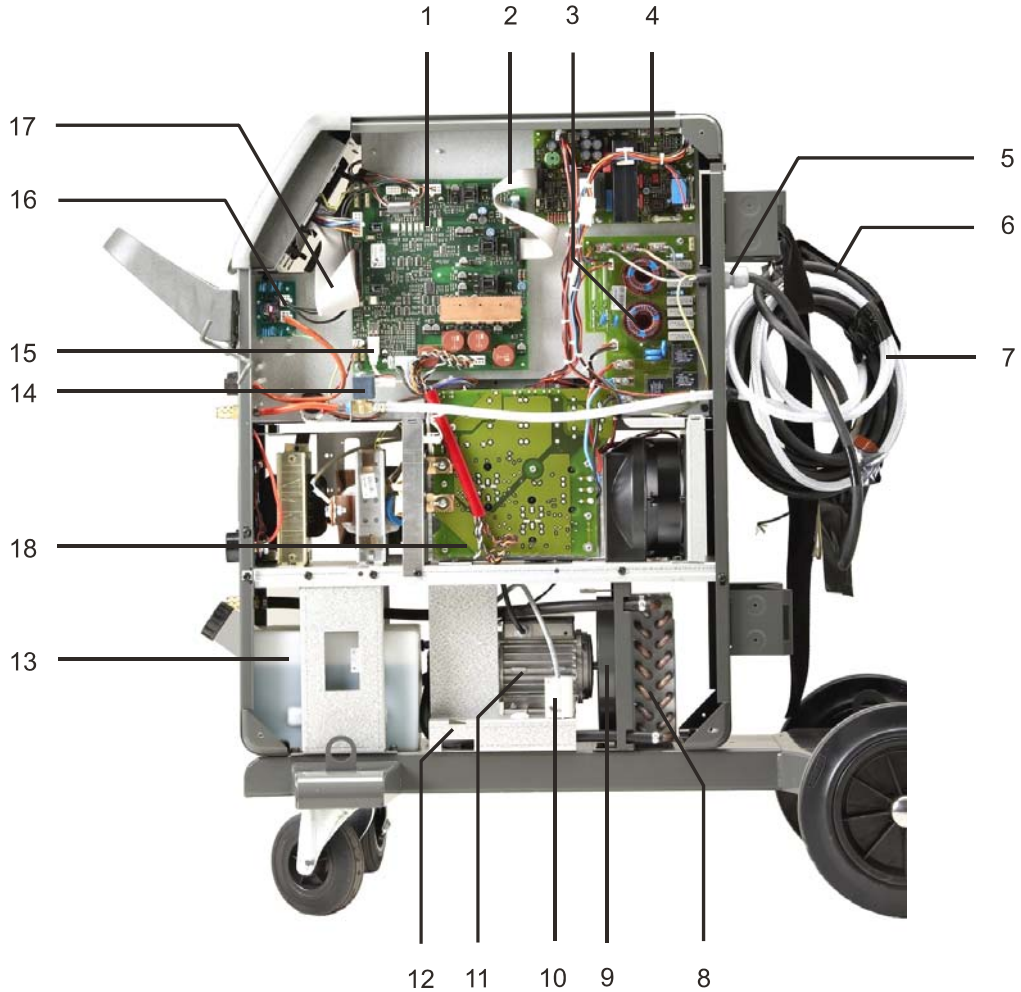
示图	代码	零件描述	英文描述
1	45050315	控制面板罩	Front panel cover
2	76117052	控制面板	Control box
3	18503605	控制旋钮Φ28	Button Φ28
4	18521208	控制旋钮帽Φ28	Cover for button Φ28
5a	61113853	PI 320前面板	Front panel PI 320
5b	61113833	PI 400前面板	Front panel PI 400
5c	61113834	PI 500前面板	Front panel PI 500
6	17110015	电源开关	Switch, waterproof
7	74471300	线束, 7芯插头	Wire harness with 7-pole plug
8	43120007	保护气体快速接头	Quick release fitting, gas
9	61113836	右侧板	Side panel, right
10	18110008	焊枪接头插座	TIG central adaptor complete
11	18110002	焊枪电缆快速插座	Dinse coupling socket
12a	43120022	冷却液导管接头Φ8mm	Quick adaptor with valve, Φ8mm
12b	45050337	快速接头, 蓝色	Bush for quick release, blue
12c	45050338	快速接头, 红色	Bush for quick release, red
13	44220125	万向前轮	Swivelling wheel
14a	45050316	护角	Corner
14b	40840514	护角螺丝M5X10mm	Screw M5X10mm
14c	41319023	长夹子M5 (螺纹修复用)	Long clip M5 (for repairment of thread)
15	70613680	焊枪挂架	Welding torch holder
16	61113835	左侧板	Side panel, left
17	45050317	散热窗	Gill
18	70613638	承载小车	Trolley
19	44210251	后轮	Wheel
20	44610001	后轮轴盖	Wheel cap

PI 320/400/500DC



示图	代码	零件描述	英文描述
1	17300042	风扇	Fan
2	71613458	缓冲板	Snubber PCB
3	12220206	输出二级管	Output recitifier
4	73940200	带插头风扇	Fan with plug
5	71617011	高频PCB	HF-print
6	16170010	电流传感器	Current sensor
7	16160142	高频变压器	Transformer HF
8	71617055	PCB快速插座	PCB, dinse coupling socket
9	74227019	电缆0.18m, 70mm ²	Cable 0.18m, 70mm ²
10a	16413414	PI 320/400 电抗器	Inductor module PI320/400
10b	16413416	PI 500 电抗器	Inductor module 500
11	74124555	软管550mm	Hose 550mm
12	74124526	软管260mm	Hose 260mm
13	43350004	冷却液管转角接头Φ8, 塑料	Angle hose connector straight Φ8, plastic
14	43350007	冷却液管接头Φ8x14", 塑料	Hose nipple straightΦ8x14", plastic
15	74120083	吸入管, 230mm	Suction hose, 230mm
16	43350006	冷却液管转角接头Φ12x14", 塑料	Angle hose nippleΦ12x14", plastic
17	74124542	软管420mm	Hose 420mm
18	43620024	铜直角 1/4"	Angle 1/4", brass
19	71613482	PCB, 不带流量控制	PCB without flow control
20	70220009	气瓶缆带	Belt for gas cylinder
21	71617038	缓冲板	Snubber PCB

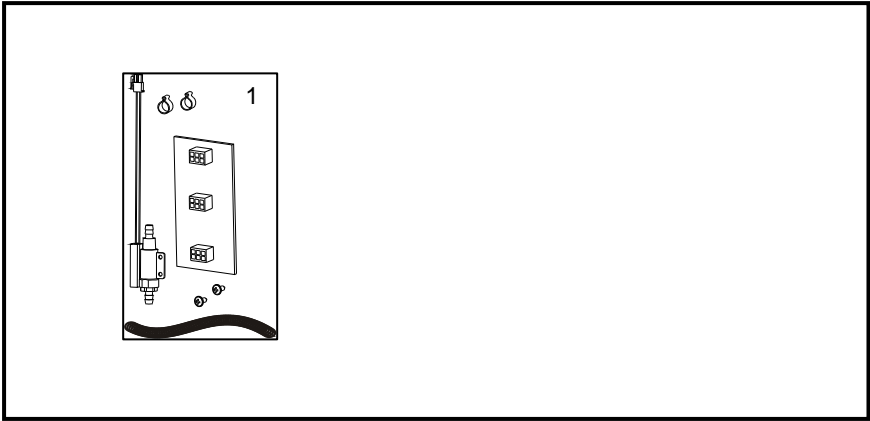
PI 320/400/500 DC



示图	代码	零件描述	英文描述
1	71617052	逆变主板	Inverter PCB
2	17200178	20芯排线, 250mm	Flat cable 20-pole, 250mm
3a	71613475	滤波板 PI320/400	Mains filter, PI320/400
3b	71613486	滤波板 PI500	Mains filter, PI500
4a	71613473	控制电源板, 400W	PCB, Power supply unit 400W
4b	17173025	2.5A保险丝	Fuse 2.5A, slow
4c	17175020	2A保险丝700Vac FF	Fuse 2A FF 700Vac
5.1	18480021	电缆螺丝插头PI320/400	Cable screw connection PI320/400
5.2	18480019	电缆螺丝插头PI500	Cable screw connection PI500
5.2a	18480018	电缆螺丝插头螺帽PI500	Nut for cable screw connection PI500
6a	74234055	输入电缆4x2.5, PI320/400	Mains supply cable 4x2.5, PI320/400
6b	74234054	输入电缆4x6.0, PI500	Mains supply cable 4x6.0, PI500
7	74120010	气体软管2.7m	Gas hose 2.7m
8	71240015	水冷单元散热器	Refrigerator
9	70123697	密封罩	Venturi
10	15480500	起动电容	Condenser 5Mf
11	17310018	水泵400Vac	Water pump 400Vac
12	24611509	水泵安装支架	Mounting plate for water pump
13	45050287	水箱, 4升	Water tank, 4 litres
14	17230012	电磁阀	Solenoid valve
15	74471258	电流传感器线束	Wire harness, current sensor
16	71617048	高频滤波板	HF filter PCB
17	17200154	40芯排线, 350mm	Flat cable 40-pole, 350mm
18a	71613526	PI320功率模块	Power module PI320
18b	71613524	PI400功率模块	Power module PI400
18c	71613522	PI500功率模块	Power module PI500
	99290510	冷却液, 10升, 浓缩	Cooling liquid, 10 litres concentrated

特殊设备

Special equipment:



示图	代码	零件描述	英文描述
1	78861257	流量控制接口	Kit for water control



WARNING



Arc welding and cutting can be dangerous to the user, people working nearby, and the surroundings if the equipment is handled or used incorrectly. Therefore, the equipment must only be used under the strict observance of all relevant safety instructions. In particular, your attention is drawn to the following:

Electricity

- The welding equipment must be installed according to safety regulations and by a properly trained and qualified person. The machine must be connected to earth through the mains cable.
- Make sure that the welding equipment is correctly maintained.
- In the case of damaged cables or insulation, work must be stopped immediately in order to carry out repairs.
- Repairs and maintenance of the equipment must be carried out by a properly trained and qualified person.
- Avoid all contact with live components in the welding circuit and with electrodes and wires if you have bare hands. Always use dry welding gloves without holes.
- Make sure that you are properly and safely earthed (e.g. use shoes with rubber sole).
- Use a safe and stable working position (e.g. avoid any risk of accidents by falling).

Light and heat emissions

- Protect the eyes as even a short-term exposure can cause lasting damage to the eyes. Use a welding helmet with suitable radiation protection glass.
- Protect the body against the light from the arc as the skin can be damaged by welding radiation. Use protective clothes, covering all parts of the body.
- The place of work should be screened, if possible, and other persons in the area warned against the light from the arc.

Welding smoke and gases

- The breathing in of the smoke and gases emitted during welding is damaging to health. Make sure that any exhaust systems are working properly and that there is sufficient ventilation.

Fire hazard

- Radiation and sparks from the arc represent a fire hazard. As a consequence, combustible materials must be removed from the place of welding.
- Working clothing should also be secure against sparks from the arc (e.g. use a fire-resistant material and watch out for folds and open pockets).
- Special regulations exist for rooms with fire- and explosion hazard. These regulations must be followed.

Noise

- The arc generates acoustic noise according to welding task. In some cases, use of hearing aids is necessary.

Dangerous areas

- Special consideration must be taken when welding is carried out in closed areas or in heights where there is a danger of falling down.

Positioning of the machine

- Place the welding machine so there is no risk that the machine will tip over.
- Special regulations exist for rooms with fire- and explosion hazard. These regulations must be followed.

Use of the machine for other purposes than it is designed for (e.g. to unfreeze water pipes) is strongly deprecated. If the occasion should arise this will be carried out without responsibility on our part.

**Read this instruction manual carefully
before the equipment is installed and in operation**

Electromagnetic emissions and the radiation of electromagnetic disturbances

This welding equipment for industrial and professional use is in conformity with the European Standard EN/IEC60974-10 (Class A). The purpose of this standard is to prevent the occurrence of situations where the equipment is disturbed or is itself the source of disturbance in other electrical equipment or appliances. The arc radiates disturbances, and therefore, a trouble-free performance without disturbances or disruption, requires that certain measures are taken when installing and using the welding equipment. **The user must ensure that the operation of the machine does not occasion disturbances of the above mentioned nature.**

The following shall be taken into account in the surrounding area:

1. Supply and signalling cables in the welding area which are connected to other electrical equipment.
2. Radio or television transmitters and receivers.
3. Computers and any electrical control equipment.
4. Critical safety equipment e.g. electrically or electronically controlled guards or protective systems.
5. Users of pacemakers and hearing aids etc.
6. Equipment used for calibration and measurement.
7. The time of day that welding and other activities are to be carried out.
8. The structure and use of buildings.

If the welding equipment is used in a domestic establishment it may be necessary to take special and additional precautions in order to prevent problems of emission (e.g. information of temporary welding work).

Methods of reducing electromagnetic emissions:

1. Avoid using equipment which is able to be disturbed.
2. Use short welding cables.
3. Place the positive and the negative cables close together.
4. Place the welding cables at or close to floor level.
5. Remove signalling cables in the welding area from the supply cables.
6. Protect signalling cables in the welding area, e.g. with selective screening.
7. Use separately-insulated mains supply cables for sensitive electronic equipment.
8. Screening of the entire welding installation may be considered under special circumstances and for special applications.

MACHINE PROGRAMME

PI 320/400/500 AC/DC

PI 320/400/500 AC/DC is a water-cooled three-phased welding machine for MMA and TIG welding. The machine can be delivered both separately without a trolley or with an integrated trolley included.

Welding hoses

The machine can be equipped with TIG welding hoses, electrode holders and return current cables from the MIGATRONIC programme.

Moreover, we can offer you the following:

- Foot control (remember to insert a special version without jumper inside, dedicated for water cooled torches)
- Handpotmeter (8-pole connector)
- Digital gas flow control
- Water flow control kit

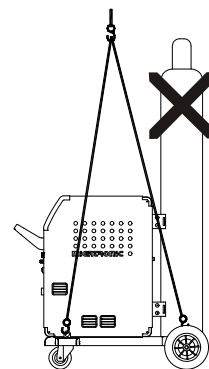
INITIAL OPERATION

Mains connection

Before connecting the power source to the mains supply, ensure that the power source is of the same voltage as the mains voltage provided and that the fuse in the mains supply is of the correct size. The mains cable (1) of the power source must be connected to the correct three-phase alternating current (AC) supply of 50 Hz or 60 Hz and with earth connection. The sequence of the phases is not of significance. The power source is switched on with the mains switch (2).

Lifting instructions

The lifting point must be used as shown in the following drawing. The machine must not be lifted with a mounted gas bottle!



Configuration

MIGATRONIC disclaims all responsibility for damaged cables and other damages related to welding with undersized welding torches and welding cables measured by welding specifications e.g. in relation to permissible load.

Warning

Connection to generators can damage the welding machine.

When connected to a welding machine, generators can produce large voltage pulses, which can damage the welding machine. Use only frequency and voltage stable generators of the asynchronous type.

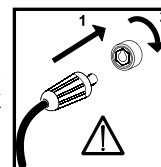
Defects on the welding machine arisen due to connection of a generator are not included in the guarantee.



Dispose of the product according to local standards and regulations.
www.migatronik.com/goto/weee

Important!

In order to avoid damage to plugs and cables, good electric contact is required when connecting the work return cable and welding torch to the machine.



Gas connection

Connect the gas hose (3) to the gas system by means of a gas pressure reducer with flow control. Fit and secure the gas hose to the gas connection (4) on the front of the machine.

Connection of welding cables

Connect the welding cables and the return current cable to the front of the machine.

Please note that the plug must be turned 45 degrees after insertion into the socket - otherwise the plug can be damaged due to excessive contact resistance.

Always connect the TIG torch in the minus (-) socket (5) and the return current cable in the plus (+) socket (6).

The control signals from the TIG torch are transmitted to the machine through the circular 7-pin plug (7). When the plug has been assembled please secure it by turning the "circulator" clockwise. Connect the gas hose to the quick connection.

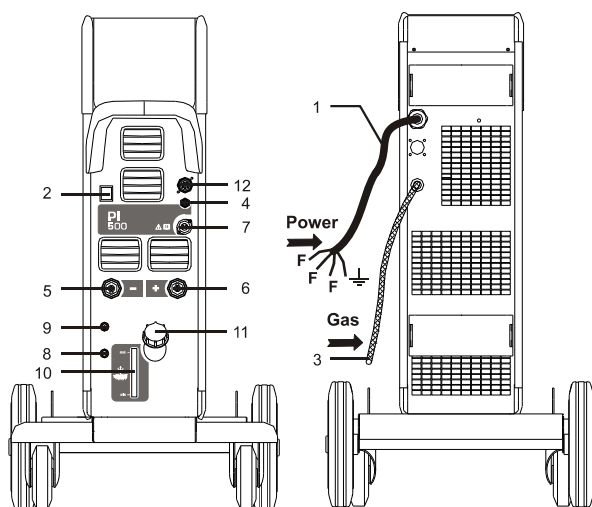
COATED ELECTRODES: Electrodes are marked with a polarity on the packing. Connect the electrode holder in accordance with this marking to the plus or minus sockets of the machine.

Connection of TIG torch

Mount the flow hose on the water cooled torch in the quick connection marked with blue (8) and the return hose in the quick connection marked with red (9).

Control of cooling liquid

The machine is delivered with integrated water cooling and the cooling liquid level should be checked regularly by means of the level control (10). The refilling of cooling liquid takes place through the filler neck (11).



Connection of electrode holder for MMA

The electrode holder and return current cable are connected to plus tap (6) and minus tap (5). Observe the instructions from the electrode supplier when selecting polarity.

Connection of foot control

Foot control is connected to the 7-poled plug (7) or through the 8-poled plug (12) (depending on the foot control type).

Connection of remote control

PI machines equipped with 8-pole control interface (12) can be controlled via a remote control or a welding robot. The remote control socket has terminals for the following functions:

A: Input signal for welding current, 0 –

+10V input impedance: 1Mohm

B: Signal ground

C: Arc detect – contact of relay (max. 1Amp), fully insulated

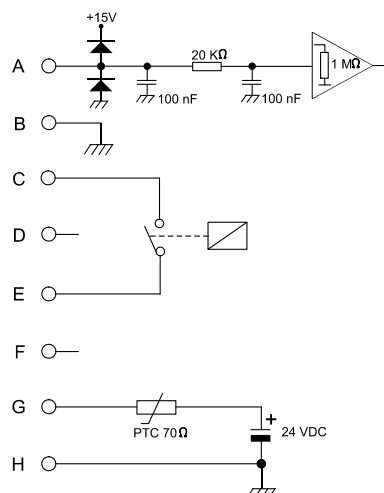
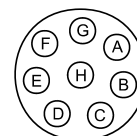
D: N.C.

E: Arc detect – contact of relay (max. 1Amp), fully insulated

F: N.C.

G: Supply +24VDC. Short circuit protected with PTC resistor (max. 50mA).

H: Supply ground



CWF Multi (option)

It is possible to connect to the PI with up to 8 CWF Multi units via dedicated CAN BUS connector placed on the rear side of machine (option). In order to permit this control capability, enter the USER Menu and select "Fdr" (feeder), then access "Act" (Active devices) and set the parameter to 1 (see USER MENU).

Now the PI is ready to control the CWF directly from the box: for each TIG welding program it is possible to select what CWF unit must be activated and the relative CWF program in the range 1 to 20.

Depending from the settings on the CWF, if the unit is in OFF mode the error message "Fdr" can be displayed on PI and the welding procediment stopped. This is to inform the user the CWF is not responding to start signal from PI.

Usage of the machine

When welding, a heating of various components of the machine takes place and during breaks these components will cool down again. It must be ensured that the flow is not reduced or stopped.

When the machine is set for higher welding currents, there will be a need for periods during which the machine can cool down.

The length of these periods depends on the current setting, and the machine should not be switched off in the meantime. If the periods for cooling down during use of the machine are not sufficiently long, the over-heating protection will automatically stop the welding process and the yellow LED in the front panel will come on. The yellow LED switches off when the machine has cooled down sufficiently and is ready for welding.

CONTROL UNIT



Control knob

All parameters are set by the use of only one control knob. These parameters include current, pulse time, slope-up time, etc.

This control knob is positioned in the right side of the control panel. The digital display shows the value of the parameter being set. The unit of measurement of the parameter is shown on the right side of the digital display.

A parameter can be selected by means of the relative keypad in the relevant section. A bright indication light indicates the parameter selected. The control knob is then used for setting a new value.



Storage of parameters - programs

This function enables storage of programs (often used machine settings) and shift from one complete program to another. By pressing the keypad the display shows a "P" and a number: "1", "2" etc. Each number includes a program with all parameters and functions of the machine. It is therefore possible to have one program for each welding job for which the machine is used.


It is possible to store 10 settings in each welding process (MMA DC and TIG DC) = 20 program settings.


Each program can be selected by:

1. Choose between MMA or TIG.
2. Finally, select program number (P01...P10). The control knob can be used for shifting between the programs when the key pad is kept pressed down

The latest used program setting in the relevant program group (MMA DC and TIG DC) will be shown when the program key pad is selected.

Reset of welding programs

Select the program that needs to be reset to factory settings. Then keep the -key pad pressed for 10 secs without turning the encoder.

The program has been reset when the current program number is flashing on and off in the display and the -key pad can then be released again.



Welding current

The key pad can be used to display the welding current in case the machine has not been set to external adjustment.

Adjustable from 5A to 320A, 400A or 500A depending on the machine model. After the welding process has stopped, the adjusted current is shown on the display. During welding, however, the actual welding current is shown. During pulse welding an average welding current is automatically shown when shifting between welding current and base current becomes faster than possible viewing.



Units for parameters

Units of measurement of the selected parameter.



Welding voltage indicator

The welding voltage indicator is illuminated for reasons of safety and in order to show if there is voltage at the output taps.



Overheating error indicator

The overheating indicator is illuminated if welding is interrupted due to overheating of the machine.



Mains error indicator

The mains error indicator is illuminated if the mains voltage is more than 15% lower than the rated voltage.



Cooling fault

Cooling fault is shown in case of connection of wrong type of torch, or if a torch has not been connected. If a flow control kit has been selected, the cooling fault may indicate problems in the cooling unit. The error code can be reset by pressing the MMA-key pad.



Fault symbols

The indicator next to the icon blinks when other types of errors occur. At the same time a fault symbol is shown in the display.

Selected error codes:

(The error code can be reset by pressing the MMA-key pad.)

E.04-00 Torch cooling fault

Cooling fault is shown in case of no circulation of the cooling liquid due to faulty connection or choking.

Check that the cooling hoses are correctly connected, top up the water tank and check welding hose and branches.

E.04-02 Mains supply fault

The icon will be shown, when the mains voltage is too high.

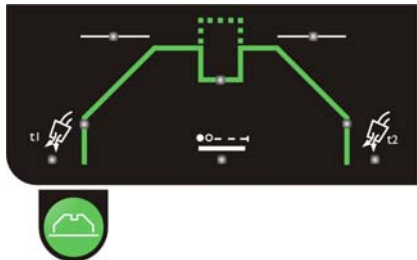
Connect the welding machine to 400V AC, +/-15% 50-60Hz.

OTHER TYPES OF FAULTS

If other fault symbols are shown in the display, the machine shall be switched off and then on to dispose of the symbol.

If the fault symbol is shown repeatedly, repair of the power source is required. Contact your distributor with information of the fault

TIG welding



TIG welding

The parameters can be adjusted with the control knob after they are shown on the display. Press the relative key to select the parameter. The relevant LED will illuminate.



Pre-flow [s]

Pre-flow is the period of time for which gas flows after the torch switch is pressed and before the HF arc is established. Variable 0-10 sec. In the LIFTIG process the period is the time until the torch is lifted away from the workpiece.



Start Amp [A%]

Immediately after the arc has been established, the machine regulates the welding current to the value stated in the Start Amp parameter. Start Amp is set as a percentage of the required welding current and is variable between 1-200% of the welding current. Please note that values higher than 100% generate a Start Amp bigger than welding current.



Slope-up [s]

Once the arc has been established, the welding process enters a slope-up stage during which the welding current is increased in linear fashion from the value stated in the Start Amp parameter to the required welding current. The duration of this slope-up time is variable 0-20 sec in steps of 0.1 sec.



Second current level

Adjustable from 10 to 200% of welding current. It is activated in four-times only by pressing and releasing quickly the torch trigger. Please note that values bigger than 100% generate a secondary current bigger than welding current.



Slope-down [s]

When welding has stopped by activating the trigger, the machine enters a slope-down stage. During this stage current is reduced from welding current to Final Amp over a period of time called the slope-down time and variable 0-20 sec in steps of 0.1 sec.



Final Amp [A%]

The slope-down stage is completed when the current level has fallen to the value stated in the Final Amp parameter. In 4-times it is possible to continue in Final Amp mode until the trigger is released. Final Amp is stated as a percentage of the required welding current and is variable between 1-90% of the welding current.



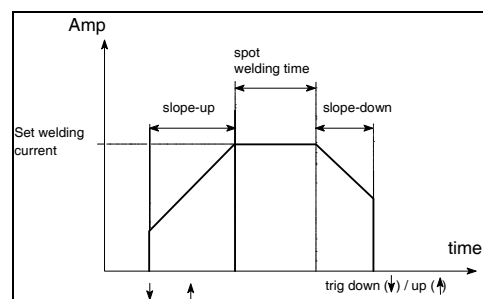
Post-flow [s]

Post-flow is the period of time for which gas flows after the arc is extinguished and is variable 0-20 sec.



Spot time


The spot time in TIG is the time from the end of slope up to beginning of slope down. Therefore, during spot time the machine is welding with the adjusted current. The LED flashes on and off when the function is active.



Set the timer before igniting the arc. The torch trigger, depending from the selected torch mode can interrupt the spot welding time. Variable 0,01-20 sec. The function is disconnected when the time is set to 0 sec.




Gas control kit (option)

Adjustment of the gas flow is possible if a gas control kit has been installed as special equipment. Press on the -key pad until the gas pre-flow and gas post-flow icons are turned on. The gas flow is variable 4 – 26 l/min. The gas valve will be completely open and the gas adjustment is disconnected when the gas flow rate is set to 27l.



CWF wire program (option)

Press on the -key pad until the slope-up and slope-down icons are turned on. The display will show X.YY where X is the CWF unit and YY is the relative program number to be used. Rotate the encoder to select unit/program. 0.00 is used when NO CWF must be activated. (default)



Slow pulse

Is used for selection of slow pulse. The pulse current is equal to the set current. It is possible to adjust:



Pulse time

Adjustable from 0.01 to 10 sec. in steps of 0.01 sec.



Pause time

Adjustable from 0.01 to 10 sec. in steps of 0.01 sec.



Base amp

Adjustable from 10 to 90% of the pulse current.



Fast pulse

Is used for selection of fast pulse. The pulse current is equal to the set current. It is possible to adjust:



Pulse frequency

For TIG DC welding the range is 25-523 Hz and For MMA DC welding the range is 25-100 Hz.



Base amp

Adjustable from 10 to 90% of the pulse current.



Synergy PLUS™

The machines automatically and dynamically adjust all overall pulse parameters during welding, when the peak welding current has been set by encoder.



TIG tack welding

The machine offers one tack welding program to allow a quick switch from welding to tack welding. The following features will be available:

- Arc ignition HF 2-times
- No slope-up/slope-down
- No pulse



Electrode welding (MMA)

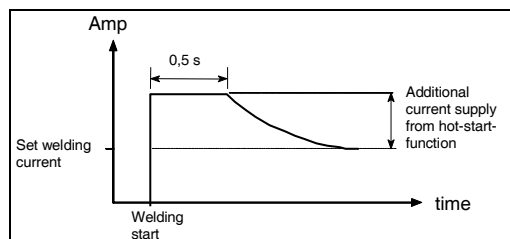
Is used for selection of electrode welding. It is not possible to change welding process during welding.



Hot start

Hot start is a function that helps to establish the arc at the beginning of MMA welding. This can be achieved by increasing welding current (when the electrode is applied to the workpiece) in relation to the set value.

This increased start amp is maintained for half a second, after which it decreases to the set value of welding current.

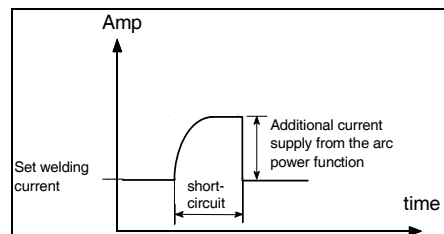


The hot start value reflects the percentage value by which initial current is increased, and can be set between 0% and 100%.



Arc-power

The arc power function is used to stabilise the arc in MMA welding. This can be achieved by increasing welding current during the short-circuits. The additional current ceases when the short circuit is no longer present.



Arc power can be adjusted between 0 and 100% of the welding current setting.

E.g. If the welding current is set to 40A and arc power to 50% the additional current is 20 A equals 60 A when doing arc power. If the arc power is set to 100% the additional current is 40 A equals 80 A when doing arc power.



Torch adjustment / remote control – 7-poled plug

The regulation of welding current is made by means of the torch potentiometer (optional). The maximum current reachable is the level previously adjusted on the front panel. The minimum current is 5A.



External adjustment – 8-poled plug (optional)

Can be used for foot pedal (optional) and remote control units (optional) that use a 8-poled plug. The function is used for arc ignition and adjustment of the current. The maximum current reachable is the level previously adjusted on the front panel. The actual current is shown on the display.



Ignition methods

It is possible to choose between 2 different methods of ignition for TIG welding: High-Frequency (HF) and LIFTIG ignition. The ignition method cannot be changed during welding. The LIFTIG ignition is active when the indicator is illuminated. The HF is automatically active when the LED is switched off.

HF-ignition

In HF-TIG ignition the electrode should not touch the workpiece. A high-frequency (HF) impulse initiates the arc when the torch trigger is activated.

The HF will not arise and the machine will stop if the electrode is in contact with the workpiece. Detach the electrode and start ignition again.

LIFTIG-ignition

In LIFTIG ignition the TIG arc is ignited after making contact between the workpiece and the tungsten electrode, after which the trigger is activated and the arc is established by lifting the electrode from the workpiece.



Trigger mode

Selection of trigger mode. Four-times trigger mode is active when the LED is illuminated, and two-times trigger mode is active when the LED is turned off. It is not possible to change trigger method during the welding process.

Two-times

The welding process begins by pressing the torch trigger. Welding continues until the trigger is released again which effects the slope-down period.

Four-times

The welding process begins by pressing the torch trigger. If the torch trigger is released during the slope-up period welding continues with the adjusted welding current. In order to stop the welding process the trigger must be pressed again for more than 0.5s after which the slope-down period begins. The slope-down period can be stopped by releasing the trigger. Thereafter the post-flow starts.

It is possible to configure the machine to work in 3 different ways when this mode is selected.

For detailed information read the section "USER MENU" of this manual about "4t.o."

Anti-freeze

This machine is provided with an anti-freeze control. The anti-freeze-control reduces the current when the electrodes stick to the weld piece. This makes it easier to break off the electrode and welding can continue.

Reset to factory settings of all programs

It is possible to recall all factory standard parameters. In this case all programs in the machine will be reset to the following value:

- MMA current 80A
- MMA hotstart 50%
- MMA arc power 50%
- TIG Current 80A
- TIG Spot Current 80A
- Pre-flow 0.0 sec
- Post-flow 3.0 sec
- No slope-up/slope-down
- Start amp 40%
- Stop amp 20%
- Second Current level 50%
- Base amp 40%
- Fast pulse frequency 49Hz
- Pause time = Pulse time = 0.1 sec

The reset procedure is as follows:

Switch off the machine and wait until display is extinguished.

Press the following key pads simultaneously:




Switch on the machine and keep the above keys pressed until the display shows "X.XX". Then release the keys.

X.XX is the software version of the program.




Reset to factory settings of a single program

Select the program in question, then press and keep pressed the -key pad for 5 secs. without turning the encoder. The display will show the current program number by flashing the segments to confirm the reset. Then you can release the key pad and the current program will be reset to factory settings (see values above).

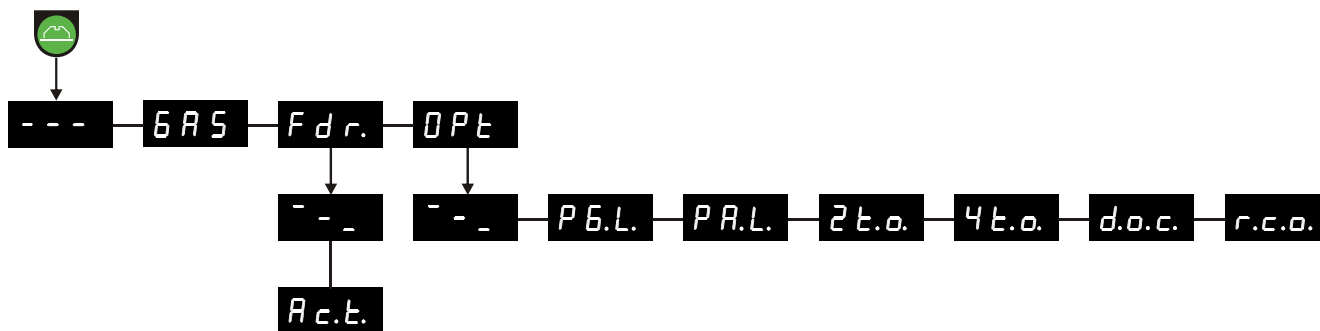


USER MENU

This menu is intended to permit advanced settings and controls of machine.

To access the user menu, press the knob  for 3 seconds when the machine is not welding, MMA or TIG mode. Rotate the encoder to point the desired option and activate the selection by pressing "A". To change the values of parameters press the knob MMA and rotate the encoder. Press "A" to save the data. Exit from menu by pressing "- - -" with the "A" knob.

The following diagram display all parameters and options of menu.



--- Exit from the USER menu

GAS Open/Close the gas valve in order to purge the torch, check the gas bottle and pressure reducer. Press "A" to Open/Close the gas. Exiting the USER menu will close the gas anyway.

Fdr. Submenu for wire feeder

--- Exit from submenu

A.c.t. Active control of CWF
0 = no CWF (default)
1 = at least one CWF

DPt Submenu containing different options:

--- Exit from the submenu (go back to main menu)

P.G.L. Programs LOCK.
Protection of programs P3 to P10 for all procediment against unintentional change of:

- welding currents, slopes, timing
- Trigger selection 2T/4T
- Current reference EXT/Internal
- Pulsations

It is still possible to select different programs and welding procediment. Programs P1 and P2 are unlocked, permitting full control of relative parameters.

When pressing locked key pads or rotating the encoder for locked parameters, the display will flash "PG.L." to remember the active protection.

0 = unlocked (default setting)

1 = locked

P.A.L. Panel LOCK.
Complete lock of box. All keypads and Encoder are disabled. When pressing locked key pads or rotating the encoder, the display will flash "PA.L." to remember the active

protection.

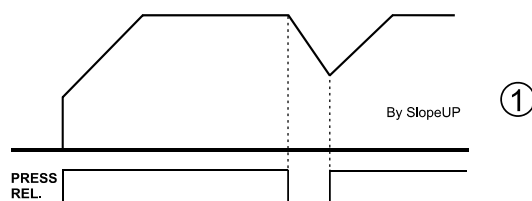
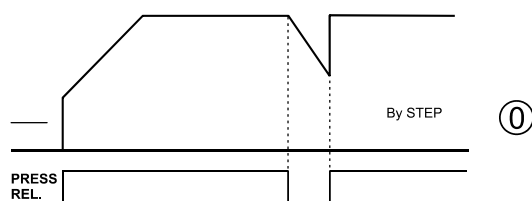
0 = unlocked (default setting)

1 = locked.

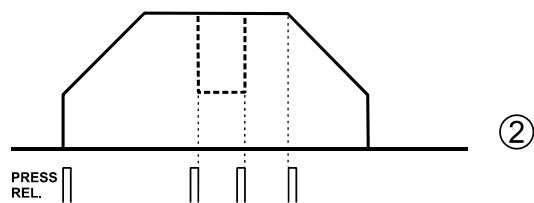
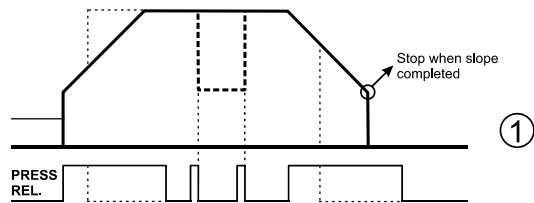
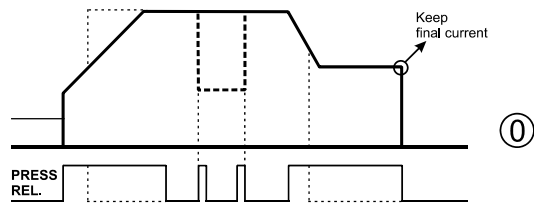
2t.o. 2-times option for torch trigger
Permit to define 2 different ways to control the retrigger of machine during slope down. For detailed description of different behaviours see the following diagrams.

0 = Immediate return to welding current (default)

1 = Return to welding current by slope up.



4 t.o. 4-times option for torch trigger.
 Permit to define 3 different ways to control the torch trigger when the machine is set as 4Times stroke (Lift or HF). For detailed description of different behaviours see the following diagrams. Select a value in the range 0...2 (1=default setting).



d.o.c. Dynamic Oxide Control. (for AC welding)

0 = disabled

1 = enabled (factory settings)

r.c.o. Remote Control Option

It is possible to select 4 different ways depending from the external device connected to 8-pole plug(option)

Welding current can be controlled up to previous SET or to MAX.

External reference voltage can be 0-10V or 0-5V (Condition 2 & 3 presents lower resolution)

0 = 0-10V → I_{min} to ISET (factory settings)

1 = 0-10V → I_{min} to I_{MAX}

2 = 0-5V → I_{min} to ISET

3 = 0-5V → I_{min} to I_{MAX}

All above settings are not modified via Reset.

TECHNICAL DATA

Power source:	PI 320 DC	PI 400 DC	PI 500 DC
Mains voltage (50Hz-60Hz)	3 x 400 V ±15%	3 x 400 V ±15%	3x400 V ±15%
Fuse	16 A	25 A	32 A
Mains current, effective	14.0 A	17.3 A	25.8 A
Mains current, max.	22.4 A	28.0 A	44.9 A
Power, (100%)	9.7 kVA	12.0 kVA	17.9 kVA
Power, max	15.5 kVA	19.3 kVA	31.0 kVA
Open circuit power	40 W	40 W	40 W
Efficiency	0.90	0.90	0.90
Power faktor	0.85	0.85	0.85
Current range	5-320 A	5-400 A	5-500 A
<i>Permitted load:</i>			
100 % duty cycle at/20°C TIG	305 A	330 A	475 A
100 % duty cycle at/20°C MMA	280 A	330 A	475 A
Max. duty cycle at/20°C TIG	320 A/95%	400A/70%	500A/80%
Max. duty cycle at/20°C MMA	320 A/60%	400A/50%	500A/65%
100 % duty cycle at/40°C TIG	265 A	290 A	420 A
100 % duty cycle at/40°C MMA	235 A	290 A	420 A
60 % duty cycle at/40°C TIG	290 A	350 A	500 A
60 % duty cycle at/40°C MMA	270 A	350 A	450 A
Max. duty cycle at/40°C TIG	320 A/50%	400A/40%	500A/60%
Max. duty cycle at/40°C MMA	320 A/35%	400A/20%	500A/55%
Open circuit voltage	95 V	95 V	95 V
¹ Application class	[S]	[S]	[S]
² Protection class (IEC 529)	IP 23	IP 23	IP 23
Standards	EN/IEC60974-1 EN/IEC60974-2 EN/IEC60974-3 EN/IEC60974-10 (Class A)	EN/IEC60974-1 EN/IEC60974-2 EN/IEC60974-3 EN/IEC60974-10 (Class A)	EN/IEC60974-1 EN/IEC60974-2 EN/IEC60974-3 EN/IEC60974-10 (Class A)
Dimensions (hwxwxl) (cm)	98x54.5x109	98x54.5x109	98x54.5x109
Weight (excl. cooling liquid)	62 kg	63 kg	68 kg

Cooling unit:	
Cooling efficiency	1.2 kW
Tank capacity	3.5 litres
Standard	EN/IEC60974-2
Flow	1.75 l/min – 1.2 bar – 60°C
Pressure max.	3 bar

Function:	Process	PI 320/400/500 DC
Arc-power	Electrode	0-100 %
Hot-start	Electrode	0-100 %
Anti-freeze	TIG/Electrode	always on
Start AMP	TIG	1-200 %
Stop AMP	TIG	1-90 %
Slope-up	TIG	0-20 secs
Slope-down	TIG	0-20 secs
Gas pre-flow	TIG	0-10 secs
Gas post-flow	TIG	0-20 secs
Spot welding time	TIG	0-180 secs
Pulse time	TIG/MMA	0,01-10 secs
Pause time	TIG/MMA	0,01-10 secs
Base Amp	TIG/MMA	10-90 %
Second current (Bilevel)	TIG	10-200%
TIG-ignition	TIG	HF / LIFTIG
Triggerfunction	TIG	2/4-stroke

¹ **[S]** The machine meets the standards which are demanded of machines working in areas where there is an increased risk of electric shock

² Equipment marked IP23 is designed for indoor and outdoor applications

MAINTENANCE

The machine requires periodical maintenance and cleaning in order to avoid malfunction and cancellation of the guarantee.

WARNING !

Only trained and qualified staff members can carry out maintenance and cleaning. The machine must be disconnected from the mains supply (pull out the mains plug!). Thereafter, wait around 5 minutes before maintenance and repairing, as all capacitors need to be discharged due to risk of shock.

Cooling unit

- Liquid level and frost protection must be checked and cooling liquid refilled as required.
- Drain the cooling liquid out of the cooling module and welding hoses. Remove dirt and flush with pure water in the tank and cooling hoses. Fill up with new cooling liquid. The machine is delivered with a cooling liquid of type propylene glycol in the ratio 1:3, which provides an anti-freeze solution up to -10°C . (See article number in the spare parts list)

Power source

- Clean the fan blades and the components in the cooling pipe with clean, dry, compressed air as required.
- A trained and qualified staff member must carry out inspection and cleaning at least once a year.

WARRANTY REGULATIONS

All MIGATRONIC machines carry a twelve month warranty against hidden defects. Such defects must be notified no later than two months after it has been noticed. The warranty runs for twelve months after invoicing to end customer.

The warranty becomes void by faults that can be attributed to incorrect installation, pests, transport damage, water- and fire damage, strokes of lightning, use in connection with a synchronous generator and use under abnormal conditions, which lies beyond the product specification.

Lack of maintenance

There is a lapse of warranty if the product is not properly maintained e.g. if the product is dirty to such a degree that cooling is hindered. The warranty does not cover damages which can be traced back to unauthorised and incorrect repairs of the product.

Wearing parts

The warranty does not cover wearing parts (welding hoses and welding cables)

Resulting damages

Use of the product must stop immediately after acknowledgement of a defect in order to avoid further damage of the product. The warranty does not cover resulting damages due to use of the product after acknowledgement of a defect. Moreover, the warranty does not cover resulting damages on other items due to product defect.



MIGATRONIC

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